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**HEAD FOR A ROBOT ARM INTENDED TO PERFORM A DEFLASHING  
OR ROUGHING OPERATION**

5 Background of the invention and description of the prior art

The subject of the present invention is a head to equip a robot arm intended to perform a deflashing or 10 roughing operation.

A certain number of items made of synthetic material and obtained by molding exhibit, after demolding, flash at the parting line. This is the case in particular of 15 the soles of footwear made of injection-molded synthetic material which may be overmolded onto the item of footwear or bonded thereto. The removal of these protruding parts is performed by manual cutting as often as not. It is also known practice for 20 deflashing to be performed using a head mounted at the end of the arm of a robot, the computer controlling the robot having incorporated the path of the machining head and the work that the tool is to perform. However, in existing devices, the mechanism employed is 25 complicated and is cantilevered with respect to the end of the robot arm.

It is also necessary to consider the fact that the tool, consisting of shears, is made to follow different 30 paths, for example to pivot through 90° in the same continuous movement in order, for example, to cut off flash at the front and rear ends, which is perpendicular to the flash located around the periphery of the sole.

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In the case of the manufacture of footwear, it is also known practice to perform roughing operations, these roughing operations being performed on the upper of the

item of footwear to improve the adhesion of thermoplastic or overmolded soles for example. The roughing operation consists in eroding a strip of material using a roughing wheel, near the region of the  
5 upper where the sole is to fit. It is also sometimes necessary to perform a roughing operation on the top surface of the upper, particularly at the front end of the foot, when the sole of the item of footwear has a return over onto the top surface of the item of  
10 footwear, particularly in order to form a reinforced toe.

In this case also, there is an issue surrounding the availability of a tool which has a significant pivoting  
15 capability so that it is just as good at roughing the periphery of the upper as it is at roughing the top thereof. In this case also, the issue is one of performing these movements using a mechanism which is as simple as possible, with optimum centering of the  
20 weight along the axis of the end of the robot arm.

#### Summary of the invention

The object of the invention is to provide a head for  
25 equipping a robot arm, intended to perform a deflashing or roughing operation, and which solves the technical problems presented previously.

To this end, the head to which the invention relates  
30 comprises:

- a fixing plate for fixing to the robot arm,
- a shaft mounted on the plate parallel thereto,
- a support for a deflashing or roughing tool mounted to pivot about the shaft and in the  
35 continuation of the region of fixing of the plate to the robot arm,
- an actuator mounted coaxial with the shaft, connected to one end of a link rod the other end

of which is connected to the tool support so as to adjust the orientation of this tool, and

- tool drive means.

- 5 The working head, whether this is a deflashing head or a roughing head, can therefore pivot about the shaft on which its support is mounted to pivot, under the action of the actuator mounted on the same axis. The number of components used is lower, and the masses are small and
- 10 are centered in the extension of the axis of the actuator.

Advantageously, the actuator for driving the link rod is a rotary actuator.

- 15 According to another feature of the invention, the link rod for adjusting the orientation of the tool acts on the tool support via a compensation actuator.

- 20 The compensation actuator makes it possible to exert a determined and constant pressure on the workpiece, thus compensating for the effects of gravity, depending on the working position of the head.
- 25 In the case of a deflashing head, this head comprises an electric motor positioned along the axis of the shaft, at the opposite end to the actuator for adjusting the position of the tool support, the output shaft of the motor being equipped with an eccentric
- 30 acting on a link rod for driving the moving blade of a pair of deflashing shears.

- 35 It should be noted that the motor is located at the opposite end to the rotary actuator with respect to the tool support, so that the masses of the actuator and of the motor respectively are balanced with respect to the end of the arm of the actuator.

In the case of a roughing head, this head comprises an electric motor secured to the support of axis perpendicular to the shaft, on which the support is mounted to pivot, and onto the output shaft of which a  
5 roughing wheel is keyed.

Brief description of the drawings

In any event, the invention will be clearly understood  
10 with the aid of the description which follows, with reference to the attached schematic drawing which, by way of nonlimiting examples, depicts two embodiments of this head.

Figure 1 is a perspective view of a deflashing head.  
15 Figure 2 is an elevation in part section of the deflashing head of figure 1.

Figure 3 is an elevation in part section, similar to figure 2, of a roughing head.

20 Description of the preferred embodiments

The head depicted in figures 1 and 2 is mounted at the end of a robot arm 2, to which it is fixed via a plate 3. A shaft 4 is mounted on this plate 3 parallel  
25 to the plane of the plate, and on this shaft there is mounted so that it can pivot a support 5 for a tool consisting of shears 6. Mounted on the shaft 4 and coaxial with the shaft 4 is a motor 7 which, via an eccentric 8, drives a link rod 9 which actuates the  
30 moving blade 10 of the pair of shears 6, the other blade 13 of which is fixed.

Mounted coaxial with the shaft 4 and on the other side of the support 5 is a rotary actuator 14 which drives a  
35 link rod 15 the other end of which is associated with the support 5 by way of a compensation actuator 16. As depicted in the drawing, the shears 6 are centered on the robot arm.

The orientation of the tool consisting of the shears 6 is given by the rotary actuator 14 which causes the link rod 15 to pivot to a greater or lesser extent, the actuator 16 being intended to ensure constant pressure  
5 on the workpiece irrespective of the position of the assembly in space.

Figure 3 depicts a roughing head, adopting the same overall geometry, in which the same elements are  
10 denoted by the same references as before. In this case, the support 5 is equipped with an electric motor 18, to the output shaft 19 of which a roughing wheel 20 is fixed. In this case too, the orientation of the working axis of the wheel is given by the action of the rotary  
15 actuator 14 by way of the link rod 15.

As is apparent from the foregoing, the invention provides a vast improvement over the existing art by providing a head to equip a robot arm, of simple and  
20 compact structure, allowing a wide freedom of movement, the compactness and the centering of the weights allowing rapid movements which are not disturbed by the presence of a significant amount of inertia.

25 In the case of a deflashing head, the support 5 could be equipped with a gripper intended, if the flash is significant in extent, to make a V-shaped incision into the flash, before the flash is cut off using the shears, it being possible for another gripper, also  
30 mounted on the support 5, to be provided in order to take hold of the flash at the end of cutting and allow its transfer, via movement of the robot, into a waste receptacle.

35 As goes without saying, the invention is not restricted to the sole embodiments of this head that are described hereinabove by way of examples; on the contrary, it encompasses all variants thereof.